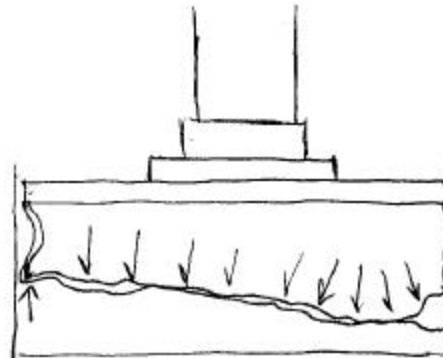


SS PRESS MEMBRANE FAILURE MODES

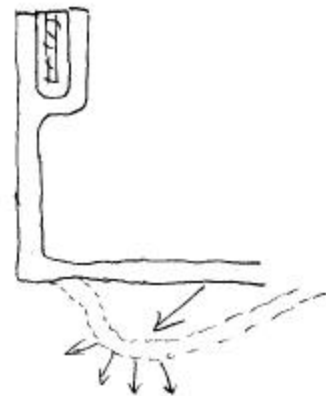
Written by Gary Lazarre

This picture depicts what happens to the diaphragm when the goods are not evenly spread over the can bottom. The diaphragm water is displaced to the low end of the cake and the high end of the cake puts extreme pressure on the heel of the diaphragm.



When the pressure on the heel is great enough and overcomes the pressure outward on the side wall, the heel must collapse. Since it is confined by the can on the outside diameter, it may collapse inwardly as shown. The collapse normally causes a "shear" failure where the cut or crack in the rubber is just under the metal ring. Alternately the diaphragm can stay vertical and try to shear off the ring. See below.

The part of the rubber that is pushed out, shown on the right side of the picture above will ultimately fail due to overstretching of the rubber. We have seen some goods that give a poor loading distribution in the can and even may leave a void down to the belt. This will fatigue the diaphragm. Thus, the best load is flat across the width of the can.



Water low in diaphragm – heel pushed upward. This can occur any time the diaphragm is under-filled. The rubber heel cannot bend out because of the can wall. The arrows show the bending force and what we see in cases like this is a crack that forms just below the radius under the metal ring.

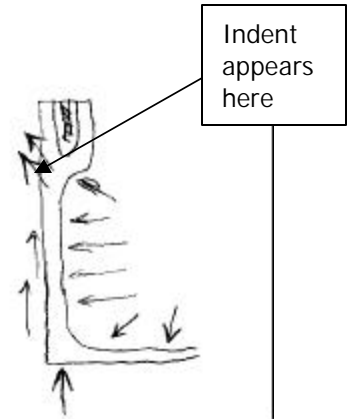


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When this crack breaks through the rubber and to the outside wall then water is allowed to leak out of the diaphragm and worsens the effect as more water is missing. The crack may also propagate to the metal ring and then damage the rubber bond to the metal ring. Alternately, the next example may occur if the side wall stays vertical and does not flex inwardly.

If the diaphragm is full of water and the high point of the cake is putting undue pressure of the heel of the membrane (because the high side is much higher than the low side of the cake) then the heel tries to shear out of the can. This normally shows up as an indented ring around the outside of the diaphragm in the position of the arrows pointed up and left. This position will also normally be opposite any wear or fatigue witness marks in the bottom of the diaphragm.



As the diaphragm is not filled properly due to a leak or rupture (fatigue crack) then the entire pressure of the ram is exerted on the heel of the diaphragm. When this occurs, the heel will collapse inwardly fatiguing the lower corner of the diaphragm. The cracked inner radius at the bottom is the result. This is normally only a result of a water deficit and will not be seen without evidence of a leak or rupture.

